## REMARKS

The foregoing replacement paragraphs for the specification include a claim for priority consistent with the declaration signed by the inventors and also include amendments to correct minor grammatical errors in the specification. The amendments are shown by brackets (deletions) and underlining (additions) in the attached *VERSION WITH MARKINGS TO SHOW CHANGES MADE*. No new matter is introduced by the added paragraph or by any of the amendments to the other paragraphs.

Respectfully submitted,

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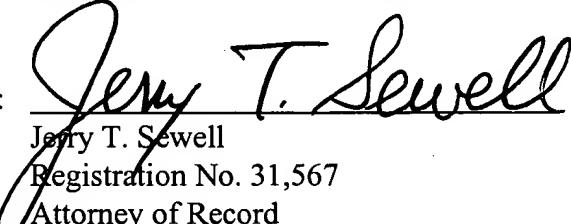
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Applicants have amended the paragraphs of the specification as set forth below. In the following paragraphs, changes to the specification are shown in brackets (deletions) and underlining (additions).

The paragraph on page 1 at lines 10-22 is amended as follows:

In conventional transmission from a mobile station to a base station, binary phase shift keying modulation is applied to low speed data (of at most several hundreds of kbps). Here, when data is transmitted at high speed (of at least 1 Mbps), the probability that the data has an error due to a change in a phase occurring when the data is demodulated is very high. In constructing a mobile communication system such as an electronic toll collecting system, high speed data transmission between a base station and a mobile station is required. However, when high speed data which has been transmitted from a vehicle moving fast to a base station is demodulated, the probability that the phase of demodulated digital data is **[changed resulting errors]** changed, resulting in errors, is very high. Accordingly, when a conventional electronic toll collecting system is used, there is a disadvantage of installing a crossing gate at a tollgate or intentionally making a vehicle detour to drop the speed of the vehicle.

The paragraph on page 3 at lines 13-29 is amended as follows:

To achieve the second object of the invention, there is provided a base station including a base station communication controller for processing data including control data to output a predetermined data frame, a base station interfacer for receiving a modulated uplink signal from the mobile station and transmitting a modulated downlink signal to the mobile station, a mixer for mixing the modulated uplink signal with a predetermined intermediate frequency and

filtering the mixed signal to convert the modulated uplink signal to a signal having the predetermined intermediate frequency, an oscillator for generating the predetermined intermediate frequency, a base station demodulator for demodulating the output signal of the mixer to generate a baseband signal according to a predetermined demodulation method, a base station source decoder for receiving the baseband signal from the base station demodulator and performing source decoding according to a predetermined method, a base station source coder for performing source coding of the data frame output from the base station communication controller, and a base station modulator for modulating the output data of the base station source coder according to a predetermined method and outputting modulated data to the base station interfacer.

The paragraph extending from page 4 at line 10 to page 5 at line 15 is amended as follows:

To achieve the third object of the invention, there is provided an electronic toll collecting system including a mobile station and a base station. The mobile station includes a mobile station communication controller for processing control data and information including start place information and balance to form and output a mobile station information data frame, receiving base station information data including destination information and billing information from the base station, and recalculating and updating the balance; a mobile station source coder for receiving the mobile station information data frame and performing source coding on it according to a predetermined coding method to output coded data; a first modulator for receiving a first carrier having a predetermined frequency and modulating the coded signal from the mobile source coder using the first carrier to generate a first modulated signal; a second modulator for receiving a second carrier having a predetermined frequency and performing modulation on the first modulated signal using the second carrier to generate a modulated uplink signal; a mobile station interfacer for transmitting the modulated uplink signal to the base station and receiving a modulated downlink signal from the base station; a first demodulator for receiving and demodulating the modulated downlink signal

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received from the base station via the mobile station interfacer and outputting demodulated data; and a mobile station source decoder for performing source decoding on the demodulated data from the first demodulator to generate a baseband signal and transmitting the baseband signal to a base station communication controller. The base station includes a base station interfacer for receiving a modulated uplink signal from the mobile station and transmitting a modulated downlink signal to the mobile station; a mixer for mixing the modulated uplink signal with a predetermined intermediate frequency and filtering the mixed signal to generate a signal having the predetermined intermediate frequency; an oscillator for generating the predetermined intermediate frequency; a base station demodulator for demodulating the output signal of the mixer to generate a baseband signal; a base station source decoder for receiving the baseband signal from the base station demodulator and performing source decoding according to a predetermined method; a base station communication controller for analyzing the mobile station's information data which is decoded and output by the base station source decoder to calculate a toll and processing data link layer control data and base station information data including destination information and billing data to form and output a predetermined base station information data frame; a base station source coder for performing source coding of the base station information data frame; and a base station modulator for modulating the output data of the base station source coder according to a predetermined method and outputting modulated data to the base station interfacer.

The paragraph on page 7 at lines 8-16 is amended as follows:

A method through which a base station provides the second carrier to a mobile station will be described with reference to FIG. 5A. FIG. 5A shows the waveform of a modulated downlink signal. As shown in FIG. 5A, after transmitting data for a predetermined time, the base station transmits only a carrier which is not modulated to a mobile station while waiting for a response from the mobile station. This carrier signal is used as the second carrier in the mobile station, and this is referred to as

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backscattering. Here, when a mobile station intending to use the carrier signal is within the communication area of the base station, the mobile station recognizes a downlink signal and immediately **[responses]** <u>responds</u>.

The paragraph extending from page 7 at line 31 to page 8 at line 28 is amended as follows:

The detailed block diagram of the base station demodulator 119 is shown in FIG. 2. The functions of the base station demodulator 119 will be described with reference to FIG. 2. The IF signal is input to an amplitude limiting amplifier 201. The amplitude limiting amplifier 201 removes noise generated on the transmission path between the base station and the mobile station and outputs a corrected stable signal having a uniform amplitude. The output signal of the amplitude limiting amplifier 201 is input to both a quadrature detection receiver 205 and a phase shifter 203. The phase shifter 203 shifts the signal by a predetermined phase (for example, 90 degrees) and outputs the result signal to the quadrature detection receiver 205. A quadrature phase detector in the quadrature detection receiver 205 multiplies the two input signals and outputs the phase difference between the two signals. A signal indicating the phase difference is filtered by a low-pass filter so that the variation of voltage is output. An amplitude comparator receives the variation of voltage and a predetermined reference value having the direct current component of an original signal and compares their amplitudes. In other words, when the variation of voltage exceeds the reference value, a logic value 1 is generated. When the variation of voltage is smaller the reference value, a logic value 0 is generated. Consequently, the output signal of the amplitude comparator 207 has the same data waveform as the Manchester encoded data received from the mobile station, in step 311. Here, although usual frequency shift keying (FSK) demodulation can be used, the base station demodulator 119 can have simple hardware configuration and can be reliable in the presence of external noise since the Manchester encoded data is DPSK modulated based on the first carrier having the predetermined frequency in the present invention. Particularly, the influence of external noise or a change in an amplitude which can be generated

on the transmission path between the base station and the mobile station can be minimized. The DPSK modulation of the present invention is expressed by Equation (1) and uses a single frequency, so that it can be easily implemented in a digital mode and is suitable for communication apparatuses reusing the frequency.

$$s(t) = A \cos 2\pi(f_1 + T) \qquad ...(1)$$

Here, f_1 is the frequency of the first carrier, and T is 0° or 180°.

The paragraph on page 10 at lines 18-20 is amended as follows:

In the embodiment described above, the base station and the mobile station **[is]** are combined to meet the convenience of the descriptions of the apparatuses of a base station and a mobile station and the communication method therebetween.

The paragraph extending from page 11 at line 18 to page 12 at line 2 is amended as follows:

The base station at the destination receives the modulated uplink signal and performs demodulation and source decoding on the modulated uplink signal to reconstruct an original data frame. The reconstructed data frame is input to the base station communication controller 123. The base station communication controller 123 reads passage information, which is transmitted from the mobile station mounted on the moving vehicle, from the reconstructed data frame and calculates a toll based on the read information. Then, the base station communication controller 123 packetizes calculated toll information, other information and data link layer control data to form a data frame, performs ASK modulation on the data frame and transmits the result signal as a modulated downlink signal to the mobile station mounted on the vehicle passing through a tollgate. Here, a method of transmitting a carrier to the mobile station is the same as described above. The mobile station on the vehicle receives the modulated downlink signal, performs demodulation and source decoding on it, analyzes information from the base station and updates its own **[database, for example,]**

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database. For example, it stores final balance obtained after subtracting the toll from current balance.

The paragraph on page 12 at lines 7-20 is amended as follows:

As described above, according to a mobile communication apparatus and method using backscattering of a carrier, self-synchronization type Manchester coding/decoding is used, thereby realizing high speed data communication and removing the necessity of a special data pattern necessary for frame synchronization. Since the present invention performs ASK modulation using a carrier received from a base station after performing DPSK modulation, a mobile station does not **[requires]** require a separate oscillator so that hardware configuration can be simplified. Consequently, a mobile station can be economically manufactured. In addition, when an electronic toll collecting system is constructed with a base station and a mobile station according to the present invention, a lot of information necessary for billing can be reliably transmitted between the mobile station mounted on a vehicle and the base station installed at a tollgate at high speed with a low error rate in an operation of automatically collecting a toll imposed on the vehicle moving at high speed.